PADSTE HIGHLIGHTS December 23, 2009

AWARDS

AAAS selects G. Jarvinen, A. Migliori, J. Sarrao, and D.L. Smith as Fellows

The American Association for the Advancement of Science (AAAS) is the world's largest general scientific society and publisher of the journal ***Science***. AAAS was founded in 1848, and includes some 262 affiliated societies and academies of science, serving 10 million individuals. AAAS selected four LANL scientists, including three from organizations within PADSTE, as Fellows. A Fellow is defined as a member "whose efforts on behalf of the advancement of science or its applications are scientifically or socially distinguished". A nomination must be sponsored by three AAAS Fellows, two of whom must have no affiliation with the nominee's institution. Nominations undergo review by the steering groups of the association's sections. Names of Fellow nominees who are approved by the steering groups are presented to the AAAS Council for election. The AAAS will honor the new Fellows at the AAAS 2010 Annual Meeting in San Diego, CA in February 2010.

Gordon Jarvinen (ADSMS) was selected in the Chemistry Section of the AAAS. He is the 2008 winner of the Glenn T. Seaborg Actinide Separations Award. Jarvinen has performed innovative research on processes that can be used to recycle plutonium and other actinides for national interests. His scientific accomplishments include research into water-soluble polymers and separation of plutonium-238 for NASA interplanetary space missions; the separation of trivalent actinides from lanthanides for advanced nuclear fuel cycles using liquid-liquid extraction; the fundamental coordination chemistry involved in extraction processes; and novel membrane separations that mimic ion-channels in biological systems. Jarvinen is a Deputy Director of the G. T. Seaborg Institute for Transactinium Science.

Albert Migliori (MPA-CMMS) was selected in the Industrial Science and Technology Section for the development of resonant ultrasound spectroscopy and its application in materials physics and technology. Migliori came to LANL as a Director's postdoctoral researcher in 1973 and became a staff member in 1976. He is as a Fellow of the American Physical Society, co-discoverer of acoustic heat engines, and the leading expert in the use of resonant ultrasound spectroscopy. He is a Deputy Director of G. T. Seaborg Institute for Transactinium Science.

John Sarrao (PADSTE-SPO) was selected in the Physics Section. His primary research interest is in the synthesis and characterization of correlated electron systems, especially actinide materials. He is the coauthor of over 510 publications, including 56 papers in ***Physical Review Letters***, ***Nature***, and ***Scienc***e. These publications have been cited more than 9000 times. He received the LANL Fellows Prize for Research, in part for his discovery of the first plutonium superconductor, and was named a Fellow of the American Physical Society. Sarrao performed his PhD thesis research at LANL, and returned to LANL as a technical staff member in 1997 following postdoctoral research with Zachary Fisk. Sarrao has served as the Division Leader of the Materials Physics and Applications Division and Group Leader of MST-10: Condensed Matter and Thermal Physics. Currently he is the Program Director for LANL's Office of Science Programs and Capture Manager for MaRIE (Matter-Radiation Interactions in Extremes).

Darryl L. Smith (T-4) was selected in the Physics Section. His research interests are in condensed matter physics and electronic materials including III-V semiconductor heterostructures and nanostructures, the electronic and optical properties of conjugated organic materials, and electrical and electro-optic devices fabricated from these materials. He is the author of over 200 technical papers. Smith is an A. P. Sloan Foundation Fellow, an American Physical Society Fellow, and a Laboratory Fellow at LANL. He has received the W. H. Sweatt Award and the LANL Fellow's Award. Smith was a member of the Defense Sciences Research Council from 1998 – 2005.

CHEMISTRY

New instrument constructed to analyze scintillator detector materials

Richard Schaller (C-PCS) constructed a new spectroscopic instrument that uses nanocrystals to determine the excitation branching ratios in scintillator detector materials. Spectroscopic (energy resolving) gamma ray detectors can help to prevent smuggling of nuclear materials and the diversion of nuclear materials in nuclear facilities. The new approach uses very high time-resolution and simultaneous energy resolution to discriminate the spectral signatures of the various excitations that can form in a nanocrystal upon interaction with a gamma ray. The new apparatus is capable of 2-picosecond time resolution, which is principally limited by temporal jitter in a streak camera, and can examine excitations that emit from the ultraviolet to the near-infrared. Energy resolution allows the differentiation of gamma-ray energies, which is necessary for nonproliferation applications because many materials are radioactive. Greater resolution identifies materials of concern versus materials that are not relevant to security. With knowledge of excitation branching ratios and synthetic feedback, larger photon yields per unit gamma ray energy may be possible. The Laboratory Directed Research and Development (LDRD) project "Novel Materials for Gamma-Ray Detection based on Nano-Engineered Semiconductor Nanocrystals" funded this work. Schaller is the Principal Investigator.

Figure 1. Vacuum chamber used for determination of excitation branching ratios in semiconductor nanocrystals.

EARTH AND ENVIRONMENTAL SCIENCES

Science selects "breakthrough" article of the year

Each year the journal ***Science*** selects the top 10 published scientific advances of the year. This year ***Science's*** choice for the top Breakthrough of the Year is the reconstruction of the 4.4-million-year-old *Ardipithecus ramidus* skeleton and her environs, published in ***Science*** as a major series of 11 articles in October (***Scienc****e*, 2 October, pp. 60–106). Although some hominins (the family that includes humans and our ancestors) are even older, *Ardipithecus* is by far the most complete specimen of such antiquity. The work changes the way scientists think about early human evolution. The discoverers proposed that *Ardipithecus* was a new kind of hominin, who had an unusual anatomy unlike that of living apes or later